United States Department of Agriculture

Animal and Plant Health Inspection Service

FY 2006

Development of Surveillance Strategies and Management Tools to Control Pseudorabies and Other Wildlife Diseases that Affect Humans and Livestock

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National Wildlife Research Center Scientists Provide Basic Ecological Information and Tools for Management of Wildlife Diseases that Affect Livestock and Humans

Wildlife Services' (WS) National Wildlife Research Center (NWRC) is the only Federal research organization devoted exclusively to resolving conflicts between people and wildlife through the development of effective, selective, and acceptable methods, tools, and techniques.

As increased urbanization leads to a loss of traditional wildlife habitat, the potential for conflicts between people and wildlife increases. Such conflicts can take many forms, but recently the potential for the transmission of diseases among wildlife, livestock, and humans has received greater attention.

The high reproductive rate and adaptability of the feral hog has resulted in populations that have dramatically increased in size and distribution. This invasive animal now occurs in 32 states, where it causes a range of agricultural and environmental damage through depredation, rooting, and wallowing activities. Furthermore, feral hogs compete with native wildlife and livestock for habitats, are carriers of exotic and endemic diseases, and transmit parasites to livestock and humans.

One disease of particular concern to the commercial swine industry is pseudorabies virus, an infectious, often acute, herpesviral disease that infects the nervous system of livestock and wildlife. The disease poses a potential hazard to humans and a major hazard to the swine industry. Adult swine that recover from pseudorabies can develop latent infections and shed the virus indefinitely, complicating eradication efforts. Feral hogs have been found seropositive for pseudorabies in 11 states where they are believed to be a free-ranging reservoir for the disease.

Major Research Accomplishments:

- WS developed surveillance strategies that evaluated the potential or actual risk that pseudorabies and other diseases in feral hogs pose to Texas livestock.
- WS developed baiting strategies for delivery of pharmaceuticals to control wildlife diseases, including pseudorabies.
- WS developed physical methods to minimize the transmission of pseudorabies and other diseases between livestock and wildlife.
- WS developed surveillance strategies to evaluate the risks of other wildlife diseases important to humans and livestock.

Applying Science and Expertise to Wildlife Challenges

Serologic Survey of Feral Hogs in Texas—The pork industry spends millions of dollars each year to prevent and eradicate diseases from domestic swine. Pseudorabies (PRV), brucellosis, and classical swine fever (CSF) have been eradicated from the domestic swine; however, PRV and brucellosis are both present in feral hog populations. A fourth disease, porcine respiratory and reproductive syndrome (PRRS), is an emerging disease in domestic swine and has recently been found in feral hog populations.

NWRC scientists conduct studies to determine the magnitude of disease prevalence in feral hog populations and ascertain whether feral hogs pose a disease threat to domestic swine. Feral hogs from eastern and southern Texas were trapped and tested for economically important diseases. Results from approximately 340 blood samples showed the prevalence of PRV, brucellosis, CSF, and PRRS was 28, 13, 0, and 1%, respectively.

Feral Hog Interactions with Domestic Swine—The feral hog population in Texas is estimated between 1.5–2 million animals, and their distribution and abundance within the state is expanding. Feral hogs are known carriers of many diseases and their presence near domestic swine may pose a disease transmission threat. To determine the potential frequency of interaction between feral hogs and neighboring domestic swine, NWRC scientists monitored penned domestic sows using motion sensing cameras and quantifying feral hog tracks. Results showed feral hogs were attracted to the domestic swine and interacted with them on 49% of the nights.

Another study involving the tracking of GPS-collared feral hog movements showed similar results. Of the locations recorded, 82 (3%) were within the defined interaction zone with domestic swine. Thus, NWRC scientists concluded that feral hogs are a potential threat for disease transmission to domestic swine.

Electric Fencing to Inhibit Feral Hog Movements—Feral hogs are implicated in erosion damage, destruction of crops, and transmission of disease to domestic livestock. Development of a cost effective barrier system to restrict feral hog movement will help alleviate and prevent these problems.

NWRC scientists evaluated the effectiveness of three different electric-fence arrangements in a captive setting with naïve, wild-caught feral hogs. The effectiveness of the most promising fence design was then tested in a field setting with wild, free-ranging feral hogs. The most promising fence arrangement, two strands at 8 and 18 inches, reduced movement of adult feral hogs by 88% and all feral hogs, including piglets, by 64%. Electric fencing has the potential to reduce problems associated with feral hogs. It is not an infallible method, however, so integrated management techniques incorporating sustained hunting, trapping, and fencing should be used.

Groups Affected By These Problems:

- Wildlife and natural resource managers
- U.S. citizens and landowners
- Livestock producers and farmers
- Sporting organizations
- Consumers
- Meat processors

Major Cooperators:

- Caesar Kleberg Wildlife Research Institute
- King Ranch, Inc.
- Texas A&M Health Sciences Center
- Texas A&M University-Kingsville
- Texas Animal Health Commission
- Texas Parks and Wildlife Department
- USDA/Agricultural Research Service
- USDA/APHIS/Veterinary Services
- USDA/APHIS/Wildlife Services
- Welder Wildlife Foundation

Multiple Paternity In Feral Hogs—NWRC scientists are gaining insights into the mating behavior of feral hogs. DNA samples from free-ranging pregnant sows and embryos were collected and analyzed. Results showed multiple paternity (siring of offspring by >1 male) in 4 of 12 feral hog litters (~33%). With this high rate of promiscuity (~33% of sows bred by >1 boar), the transmission rates increase for diseases spread by direct contact (e.g., pseudorabies, brucellosis). Results of this study provide valuable information useful for planning feral hog management in relation to the rate of disease transmission.

Feral Hog Bait Acceptability—Few studies have evaluated oral delivery systems of pharmaceuticals (e.g., vaccines) to feral hogs. A recent NWRC study assessed the percentage of feral hogs and non-target animals that removed and consumed PIGOUT® fish-flavored baits intended for feral hogs. Of the 1,178 iophenoxic acid (IA)-marked baits that were distributed and monitored, 51% were taken by raccoons, 22% were taken by feral hogs, and 20% were taken by collared peccaries. PIGOUT® fish-flavored baits were successful in marking a substantial proportion of feral hogs; however, removal rates suggest the majority of the baits were taken by non-target species and, therefore, unsuitable for many pharmaceutical applications in their current form. Other bait studies have shown that when targeting feral hogs, fish-flavored baits may be most appropriate when non-targets include herbivores, and that vegetable-flavored baits may be most appropriate when non-targets include omnivores and carnivores. Future research seeks to identify hog-specific chemical attractants for incorporation into baits.

Movements and Habitat Use of Nilgai Antelope in Southern Texas—The nilgai antelope was successfully introduced into South Texas in 1941 in an effort to occupy an ecological role intermediate between native wildlife and livestock. Nilgai now range freely throughout much of coastal south Texas, and current statewide estimates exceed 30,000 individuals. Nilgai are beneficial because they are hunted recreationally and harvested commercially for venison. Negative aspects of nilgai populations are damage to fences and competition for forage with deer and cattle. Anecdotal reports from landowners suggested that nilgai move long distances and their home ranges may encompass properties of multiple landowners. Such movement patterns could make nilgai difficult to manage. To address these issues, NWRC scientists are investigating nilgai home range size and movement patterns in relation to habitat characteristics, hunting and grazing pressure. To date, 32 nilgai have been captured and radio collared. Preliminary results show nilgai moving 15 miles from their capture location.

Roundworm in Raccoons—Raccoon roundworm primarily uses the raccoon as its host, but has also been found in more than 90 species of North American wildlife. In non-raccoon hosts, including humans, this parasitic nematode causes severe neurological disease, often damaging visceral and ocular tissues. NWRC scientists studied the presence of raccoon roundworm in raccoons in a semi-arid region of Texas. Of 19 raccoons captured, three had raccoon roundworm. Scientists note that to reduce the risk of raccoon roundworm range expansion and transmission to other species in semi-arid regions of Texas, it may be necessary to limit supplemental feeding activities and/or restrict feed consumption by raccoons.

Selected Publications:

Campbell, T. A., S. J. Lapidge, and D. B. Long. 2006. Using baits to deliver pharmaceuticals to feral swine in southern Texas. Wildlife Society Bulletin 34:1184-1189.

Long, D. B., T. A. Campbell, and S. E. Henke. 2006. Baylisascaris procyonis (Nematoda: Ascaridoidea) in raccoons (Procyon lotor) from Duval County, Texas. Texas Journal of Science 58:281-285.

Wyckoff, A. C., S. Henke, T. A. Campbell, D. Hewitt, and K. Vercauteren. 2005. Preliminary serologic survey of selected diseases and movements of feral swine in Texas. Proceedings of the Wildlife Damage Management Conference 11:23-32.